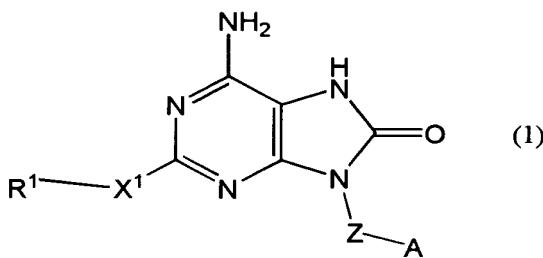


CLAIM

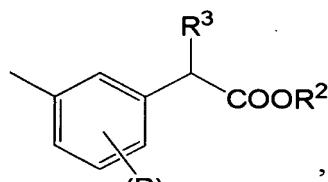
1. An 8-oxoadenine compound represented by the following formula

(1):

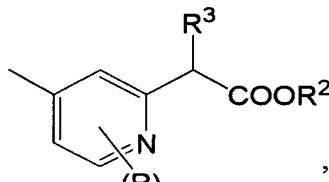


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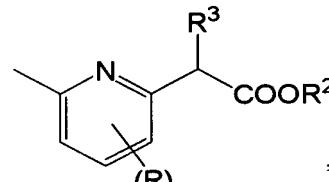
, wherein A is a group selected from the group consisting of the following formulas (2) to (8):



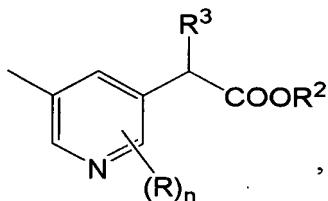
(2)



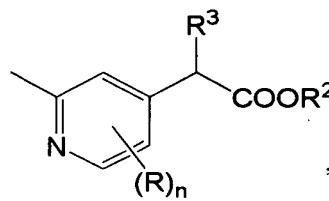
(3)



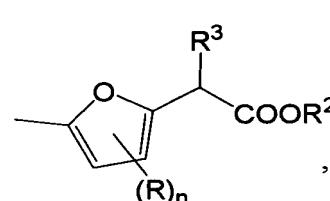
(4)



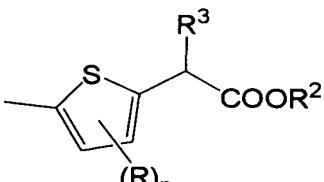
(5)



(6)



(7)



(8)

, wherein R² is hydrogen atom, or a substituted or unsubstituted

10

alkyl group;

R³ is hydrogen atom or an alkyl group;

R is a halogen atom, a haloalkyl group, a haloalkoxy group, an alkyl group, an alkoxy group, amino group, an alkylamino group or dialkylamino group; n is an integer of 0 to 2, and when n is 2, R_S may be the same or different;

5 X¹ is oxygen atom, sulfur atom, SO₂, NR⁴ (wherein R⁴ is hydrogen atom or an alkyl group.), or a single bond;

Z is a straight or branched chain alkylene;

R¹ is hydrogen atom, a halogen atom, a substituted or unsubstituted alkyl group, a substituted or unsubstituted alkenyl group, a substituted or

10 unsubstituted alkynyl group, a substituted or unsubstituted aryl group, a substituted or unsubstituted heteroaryl group or a substituted or unsubstituted cycloalkyl group,

or a pharmaceutically acceptable salt thereof.

2. The 8-oxoadenine compound according to claim 1, wherein

15 R² is a substituted or unsubstituted C₁₋₈ alkyl group, wherein said alkyl group may be substituted by one or plural substituents which may be the same or different,

and the substituents on said alkyl group are selected from the group consisting of a halogen atom, hydroxy group, carboxy group, C₃₋₈ cycloalkyl

20 group, an C₁₋₆ alkoxy group, an C₁₋₆ alkylthio group, a C₃₋₈ cycloalkoxy group, an C₂₋₁₀ acyloxy group, an C₁₋₆ alkylsulfonyl group, an C₁₋₆ alkylsulfinyl group, a substituted or unsubstituted carbamoyl group, a substituted or unsubstituted sulfamoyl group, a substituted or

25 amino group, a substituted or unsubstituted 6 to 10 membered aryl group, a substituted or unsubstituted 5 to 10 membered heteroaryl group which contains 1 to 4 hetero atoms consisting of 0 to 2 nitrogen atoms, 0 to 1 oxygen atom and 0 to 1 sulfur atom, and a substituted or unsubstituted 4 to 7 membered saturated heterocyclic group which contains 1 to 4 hetero atoms consisting of 0 to 2 nitrogen atoms, 0 to 2 oxygen atoms and 0 to 2 sulfur atoms;

R^3 is hydrogen atom or an alkyl group.

R is a halogen atom, a C_{1-6} haloalkyl group, a C_{1-6} haloalkoxy group, an C_{1-6} alkyl group, an C_{1-6} alkoxy group, amino group, an C_{1-6} alkylamino group, or a di C_{1-6} alkyl amino group;

5 n is an integer of 0 to 2, and when n is 2, R_s may be the same or different; X^1 is oxygen atom, sulfur atom, SO_2 , NR^4 (wherein R^4 is hydrogen atom or an C_{1-6} alkyl group.), or a single bond;

Z is a straight or branched chain C_{1-8} alkylene;

10 R^1 is hydrogen atom, a halogen atom, a substituted or unsubstituted alkyl group, a substituted or unsubstituted alkenyl group, a substituted or unsubstituted alkynyl group, a substituted or unsubstituted cycloalkyl group, a substituted or unsubstituted aryl group, or a substituted or unsubstituted heteroaryl group;

15 and the substituents of the said alkyl group, alkenyl group and alkynyl group are selected from the group consisting of a halogen atom, hydroxy group, carboxy group, an C_{1-6} alkoxy group, a C_{1-6} haloalkoxy group, an C_{1-6} alkylthio group, an C_{1-6} alkylsulfonyl group, an C_{1-6} alkylsulfinyl group, an C_{2-5} alkoxycarbonyl group, an C_{2-10} acyloxy group, a substituted or unsubstituted amino group, a substituted or unsubstituted carbamoyl

20 group, a substituted or unsubstituted sulfamoyl group, an ureido group which may be substituted by the same or different one or two alkyl groups, a substituted or unsubstituted 6 to 10 membered aryl group, a substituted or unsubstituted aryloxy group, a substituted or unsubstituted arylthio group, a substituted or unsubstituted 5 to 10 membered heteroaryl group

25 which contains 1 to 4 hetero atom selected from 0 to 2 nitrogen atoms, 0 to 1 oxygen atom and 0 to 1 sulfur atom, a substituted or unsubstituted heteroaryloxy group, a substituted or unsubstituted heteroarylthio group, a substituted or unsubstituted C_{3-8} cycloalkyl group, a substituted or unsubstituted C_{3-8} cycloalkoxy group, a substituted or unsubstituted cycloalkylthio group, a substituted or unsubstituted 4 to 7 membered

- saturated heterocyclic group which contains 1 to 4 hetero atoms selected from 0 to 2 nitrogen atoms, 0 to 2 oxygen atoms and 0 to 2 sulfur atoms, a substituted or unsubstituted saturated heterocycle-oxy group, and a substituted or unsubstituted saturated heterocycle-thio group;
- 5 and the substituents of said amino group, carbamoyl group and sulfamoyl group are selected from the group consisting an C₁₋₆ alkyl group, an C₂₋₆ alkenyl group, an C₂₋₆ alkynyl group, an C₃₋₆ acycloalkyl group, an C₂₋₅ alkylcarbonyl group, an C₂₋₅ alkoxycarbonyl group and an C₁₋₆ alkylsulfonyl group (the above seven groups may be substituted by a halogen atom, hydroxy group or an alkoxy group, respectively.), or the two substituents may be combined together to form a substituted or unsubstituted 4 to 7 membered saturated heterocyclic group containing 1 to 4 hetero atoms selecting from 1 to 2 nitrogen atoms, 0 to 1 oxygen atom and 0 to 1 sulfur atom;
- 10 the substituents of said aryl group, aryloxy group, arylthio group, heteroaryl group, heteroaryloxy group, heteroarylthio group, cycloalkyl group, cycloalkoxy group, cycloalkylthio group, saturated heterocyclic group, saturated heterocycle-oxy group, saturated heterocycle-thio group and saturated nitrogen containing heterocyclic group are selected from the group consisting of a halogen atom, hydroxy group, carboxy group, an C₁₋₆ alkyl group, an C₁₋₆ alkoxy group, an C₂₋₅ alkylcarbonyl group, an C₂₋₅ alkoxycarbonyl group (the above four groups may be substituted by a halogen atom, hydroxy group or an alkoxy group, respectively), a C₁₋₆ haloalkyl group, a C₁₋₆ haloalkoxy group, amino group, an C₁₋₆ alkylamino group, and a di C₁₋₆ alkyl amino group, in the formula (1),
- 15 or its pharmaceutically acceptable salt.
- 20 3. The 8-oxoadenine compound or a pharmaceutically acceptable salt thereof according to claim 1 or 2, wherein R² in the formula (1) is methyl group.
- 25 4. The 8-oxoadenine compound or a pharmaceutically acceptable salt

thereof according to claim 1 or 2, wherein R² in the formula (1) is a substituted C₂₋₆ alkyl group.

5. The 8-oxoadenine compound or a pharmaceutically acceptable salt thereof according to claim 4, wherein R² in the formula (1) is an C₂₋₁₀ alkyl group substituted by a substituted or unsubstituted amino group.

6. The 8-oxoadenine compound or a pharmaceutically acceptable salt thereof according to any one of claims 1 to 5, wherein R³ in the formula (1) is hydrogen atom.

10 7. The 8-oxoadenine compound or a pharmaceutically acceptable salt thereof according to any one of claims 1 to 6, wherein Z in the formula (1) is a straight chain C₁₋₆ alkylene group.

8. The 8-oxoadenine compound or a pharmaceutically acceptable salt thereof according to any one of 1 to 7, wherein X¹ in the formula (1) is a single bond, oxygen atom or sulfur atom.

15 9. The 8-oxoadenine compound or a pharmaceutically acceptable salt thereof according to any one of claims 1 to 8, wherein R¹ in the formula (1) is an C₁₋₆ alkyl group which is optionally substituted by an alkoxy carbonyl group, hydroxy group or an alkoxy group.

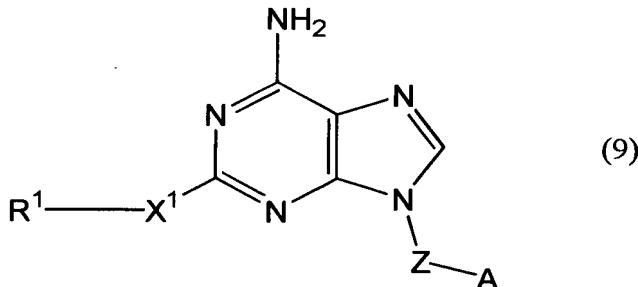
10. The 8-oxoadenine compound or a pharmaceutically acceptable salt thereof according to claim 1, wherein X¹ in the formula (1) is a single bond, R¹ is an C₁₋₆ alkyl group which is substituted by methoxycarbonyl group.

11. A pharmaceutical composition containing the 8-oxoadenine compound or a pharmaceutically acceptable salt thereof as claimed in any one of claims 1 to 10 as an active ingredient.

25 12. A medicament for topical administration containing the 8-oxoadenine compound or a pharmaceutically acceptable salt thereof as claimed in any one of claims 1 to 10 as an active ingredient.

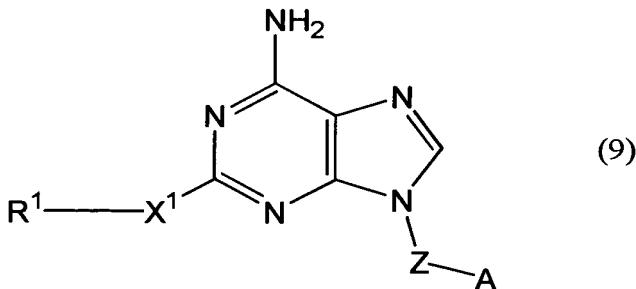
13. An immuno-modulator containing the 8-oxoadenine compound or a pharmaceutically acceptable salt thereof as claimed in any one of claims 1 to 10 as an active ingredient.

14. A therapeutic or prophylactic agent for viral diseases, cancers or allergic diseases containing the 8-oxoadenine compound or a pharmaceutically acceptable salt thereof as claimed in any one of claims 1 to 10 as an active ingredient.
- 5 15. Use of the 8-oxoadenine compound, or a pharmaceutically acceptable salt thereof as claimed in any of claim 1 to 10 as a medicament.
16. Use of the 8-oxoadenine compound, or a pharmaceutically acceptable salt thereof as claimed in any of claims 1 to 10 for manufacturing an immuno-modulator.
- 10 17. Use of the 8-oxoadenine compound, or a pharmaceutically acceptable salt thereof as claimed in any of claims 1 to 10 for manufacturing a therapeutic or prophylactic agent for viral diseases, cancers or allergic diseases.
- 15 18. A method for modulating immune response which comprises administering, to a patient an effective amount of the 8-oxoadenine compound, or a pharmaceutically acceptable salt thereof as claimed in any of claims 1 to 10.
- 20 19. A method for treating or preventing viral diseases, cancers or allergic diseases which comprises administering, to a patient an effective amount of the 8-oxoadenine compound, or a pharmaceutically acceptable salt thereof as claimed in any of claims 1 to 10.
- 25 20. A process for preparing the 8-oxoadenine compound as claimed in any of claims 1 to 10, which comprises brominating a compound represented by the formula (9):



, wherein A, Z, R¹ and X¹ are the same as defined above, and hydrolyzing the resultant or reacting the resultant with a metal alkoxide and then hydrolyzing.

21. A compound represented by the formula (9):



5

, wherein A, Z, R¹ and X¹ are the same as defined in claim 1.

22. An 8-oxoadenine compound or its pharmaceutically acceptable salt selected from the group consisting of the following compounds:

- 8-hydroxy-2-(3-hydroxypropyl thio)-9-(3-methoxycarbonylmethylbenzyl)adenine,
- 8-hydroxy-2-(4-hydroxybutylthio)-9-(3-methoxycarbonylmethylbenzyl)adenine,
- 8-hydroxy-2-(2-methoxyethylthio)-9-(3-methoxycarbonylmethylbenzyl)adenine,
- 8-hydroxy-2-(3-hydroxypropoxy)-9-(3-methoxycarbonylmethylbenzyl)adenine,
- 8-hydroxy-2-(2-hydroxyethoxy)-9-(3-methoxycarbonylmethylbenzyl)adenine,
- 8-hydroxy-2-(4-hydroxybutoxy)-9-(3-methoxycarbonylmethylbenzyl)adenine,
- 8-hydroxy-9-(3-methoxycarbonylmethylbenzyl)-2-(4,4,4-trifluorobutoxy)adenine,
- 8-hydroxy-9-(3-methoxycarbonylmethylbenzyl)-2-[N-(2-methoxyethyl)amino]adenine,
- 2-butoxy-8-hydroxy-9-[2-(3-methoxycarbonylmethylphenyl)ethyl]adenine,
- 2-butoxy-8-hydroxy-9-[3-(3-methoxycarbonylmethylphenyl)propyl]adenine,

- 2-(2,3-dihydroxy-1-propoxy)-8-hydroxy-9-(3-methoxycarbonylmethylbenzyl)adenine,
2-(2-ethoxyethoxy)-8-hydroxy-9-(3-methoxycarbonylmethylbenzyl)adenine,
2-cyclohexylmethoxy-8-hydroxy-9-(3-methoxycarbonylmethylbenzyl)adenine,
5
2-benzyloxy-8-hydroxy-9-(3-methoxycarbonylmethylbenzyl)adenine,
8-hydroxy-2-(2-methoxycarbonylethyl)-9-(3-methoxycarbonylmethylbenzyl)adenine,
2-butoxy-8-hydroxy-9-[(5-methoxycarbonylmethyl-2-thienyl)methyl]adenine,
10
2-butoxy-8-hydroxy-9-[(2-methoxycarbonylmethyl-4-pyridyl)methyl]adenine,
2-butoxy-8-hydroxy-9-[(6-methoxycarbonylmethyl-2-pyridyl)methyl]adenine,
15
2-butoxy-8-hydroxy-9-[(4-methoxycarbonylmethyl-2-pyridyl)methyl]adenine,
2-butoxy-8-hydroxy-9-[(2-methoxy-5-methoxycarbonylmethyl)benzyl]adenine,
2-butoxy-9-[(4-fluoro-3-methoxycarbonylmethyl)benzyl]-8-hydroxyadenine,
20
2-butoxy-8-hydroxy-9-[(4-methoxy-3-methoxycarbonylmethyl)benzyl]adenine,
2-butylthio-8-hydroxy-9-(3-methoxycarbonylmethylbenzyl)adenine,
2-[3-(ethylsulfonyl)propoxy]-8-hydroxy-9-(3-methoxycarbonylmethylbenzyl)adenine,
25
8-hydroxy-9-(3-methoxycarbonylmethylbenzyl)-2-[3-(methylsulfonyl)propoxy]adenine,
8-hydroxy-9-(3-methoxycarbonylmethylbenzyl)-2-(4-pyridylmethylamino)adenine,
8-hydroxy-9-(3-methoxycarbonylmethylbenzyl)-2-[2-methoxyethyl(N-methyl)amino]adenine,
30

- 2-benzylamino-8-hydroxy-9-(3-methoxycarbonylmethylbenzyl)adenine,
8-hydroxy-9-(3-methoxycarbonylmethylbenzyl)-2-[(4-pyridylmethyl)oxy]adenine,
2-ethoxy-8-hydroxy-9-(3-methoxycarbonylmethylbenzyl)adenine,
5 8-hydroxy-9-(3-methoxycarbonylmethylbenzyl)-2-propoxyadenine,
8-hydroxy-9-(3-methoxycarbonylmethylbenzyl)-2-pentoxadenine,
2-butoxy-8-hydroxy-9-{3-[(4-dimethylaminobutoxy)carbonylmethyl]benzyl}adenine,
2-ethoxy-8-hydroxy-9-{3-[(4-dimethylaminobutoxy)carbonylmethyl]benzyl}adenine,
10 2-butoxy-8-hydroxy-9-{3-[(2-dimethylaminoethoxy)carbonylmethyl]benzyl}adenine,
2-butoxy-8-hydroxy-9-{3-[(3-dimethylaminopropoxy)carbonylmethyl]benzyl}adenine,
2-butoxy-8-hydroxy-9-{3-[(6-dimethylaminohexanoxy)carbonylmethyl]benzyl}adenine,
15 2-butoxy-8-hydroxy-9-{3-[(3-diethylaminopropoxy)carbonylmethyl]benzyl}adenine,
2-butoxy-8-hydroxy-9-{3-[(2-morpholinoethoxy)carbonylmethyl]benzyl}adenine,
2-butoxy-8-hydroxy-9-{3-[(2-piperidinoethoxy)carbonylmethyl]benzyl}adenine,
20 2-butoxy-8-hydroxy-9-{3-[(2,2,2-trifluoroethoxy)carbonylmethyl]benzyl}adenine,
2-butoxy-8-hydroxy-9-{3-[(2-hydroxyethoxy)carbonylmethyl]benzyl}adenine,
2-butoxy-8-hydroxy-9-{3-[(2-hydroxyethoxy)carbonylmethyl]benzyl}adenine,
25 2-butoxy-8-hydroxy-9-{3-[(2,3-dihydroxypropoxy)carbonylmethyl]benzyl}adenine,
2-butoxy-8-hydroxy-9-{5-[(4-dimethylaminobutoxy)carbonylmethyl]-2-methoxybenzyl}adenine,
8-hydroxy-2-(4-hydroxybutylthio)-9-{3-[(2-hydroxyethoxy)carbonylmethyl]benzyl}adenine,
30

- 8-hydroxy-9-{3-[(4-dimethylaminobutoxy)carbonylmethyl]benzyl}-2-[(4-pyridylmethyl)oxy]adenine,
2-[2-(4-bromophenoxy)ethoxy]-8-hydroxy-9-(3-methoxycarbonylmethylbenzyl)adenine,
5 8-hydroxy-9-(3-methoxycarbonylmethylbenzyl)-2-(2-phenyloxyethoxy)adenine,
2-(3-aminopropoxy)-8-hydroxy-9-(3-methoxycarbonylmethylbenzyl)adenine,
2-[3-(N-acetylamino)propoxy]-8-hydroxy-9-(3-methoxycarbonylmethylbenzyl)adenine,
10 8-hydroxy-2-[3-(N-methanesulfonylamino)propoxy]-9-(3-methoxycarbonylmethylbenzyl)adenine,
8-hydroxy-2-[3-(N-methoxycarbonylamino)propoxy]-9-(3-methoxycarbonylmethylbenzyl)adenine,
8-hydroxy-9-(3-methoxycarbonylmethylbenzyl)-2-(3-ureidoproxy)adenine,
15 2-(2-diethylaminoethoxy)-8-hydroxy-9-(3-methoxycarbonylmethylbenzyl)adenine,
8-hydroxy-9-(3-methoxycarbonylmethylbenzyl)-2-trifluoromethyladenine,
2-butyl-8-hydroxy-9-(3-methoxycarbonylmethylbenzyl)adenine,
8-hydroxy-9-(3-methoxycarbonylmethylbenzyl)-2-pentyladenine,
20 8-hydroxy-9-(3-methoxycarbonylmethylbenzyl)-2-(3-methoxypropyl)adenine,
2-ethoxymethyl-8-hydroxy-9-(3-methoxycarbonylmethylbenzyl)adenine,
2-ethoxymethyl-8-hydroxy-9-{3-[(4-dimethylaminobutoxy)carbonylmethyl]benzyl}adenine,
2-cyclopentyl-8-hydroxy-9-(3-methoxycarbonylmethylbenzyl)adenine,
25 8-hydroxy-2-(3-hydroxypropyl)-9-(3-methoxycarbonylmethylbenzyl)adenine,
2-(4-fluorobenzyl)-8-hydroxy-9-(3-methoxycarbonylmethylbenzyl)adenine,
8-hydroxy-9-(3-methoxycarbonylmethylbenzyl)-2-(2-pyridylmethoxy)adenine,
8-hydroxy-9-(3-methoxycarbonylmethylbenzyl)-2-(3-pyridylmethoxy)adenine,
30

- 8-hydroxy-9-(3-methoxycarbonylmethylbenzyl)-2-(3-morpholinopropoxy)adenine,
8-hydroxy-9-(3-methoxycarbonylmethylbenzyl)-2-{2-(phenylsulfanyl)ethoxy}adenine,
5 8-hydroxy-9-(3-methoxycarbonylmethylbenzyl)-2-(2-methylsulfanylethoxy)adenine,
8-hydroxy-9-(3-methoxycarbonylmethylbenzyl)-2-phenylsulfanyladenine,
8-hydroxy-9-(3-methoxycarbonylmethylbenzyl)-2-(tetrahydrofuran-2-ylmethoxy)adenine,
10 9-(3-carboxymethylbenzyl)-8-hydroxy-2-(3-hydroxypropylthio)adenine,
9-(3-carboxymethylbenzyl)-8-hydroxy-2-(4-hydroxybutylthio)adenine,
9-(3-carboxymethylbenzyl)-8-hydroxy-2-(2-methoxyethylthio)adenine,
9-(3-carboxymethylbenzyl)-8-hydroxy-2-(3-hydroxypropoxy)adenine,
9-(3-carboxymethylbenzyl)-8-hydroxy-2-(2-hydroxyethoxy)adenine,
15 9-(3-carboxymethylbenzyl)-8-hydroxy-2-(4-hydroxybutoxy)adenine,
9-(3-carboxymethylbenzyl)-8-hydroxy-2-(4,4,4-trifluorobutoxy)adenine,
9-(3-carboxymethylbenzyl)-8-hydroxy-2-[N-(2-methoxyethyl)amino]adenine,
2-butoxy-9-[2-(3-carboxymethylphenyl)ethyl]-8-hydroxyadenine,
2-butoxy-9-[3-(3-carboxymethylphenyl)propyl]-8-hydroxyadenine,
20 9-(3-carboxymethylbenzyl)-2-(2,3-dihydroxy-1-propoxy)-8-hydroxyadenine,
9-(3-carboxymethylbenzyl)-2-(2-ethoxyethoxy)-8-hydroxyadenine,
9-(3-carboxymethylbenzyl)-2-cyclohexylmethoxy-8-hydroxyadenine,
2-benzyloxy-9-(3-carboxymethylbenzyl)-8-hydroxyadenine,
2-(2-carboxyethyl)-9-(3-carboxymethylbenzyl)-8-hydroxyadenine,
25 2-butoxy 9-((5-carboxymethyl-2-thienyl)methyl)-8-hydroxyadenine,
2-butoxy-9-((6-carboxymethyl-2-pyridyl)methyl)-8-hydroxyadenine,
2-butoxy-9-((4-carboxymethyl-2-pyridyl)methyl)-8-hydroxyadenine,
2-butoxy-9-(5-carboxymethyl-2-methoxy)benzyl-8-hydroxyadenine,
2-butoxy-9-(3-carboxymethyl-4-fluoro)benzyl-8-hydroxyadenine,
30 2-butoxy-9-(3-carboxymethyl-4-methoxy)benzyl-8-hydroxyadenine,

9-(3-carboxymethylbenzyl)-2-ethoxy-8-hydroxyadenine,
9-(3-carboxymethylbenzyl)-8-hydroxy-2-propoxyadenine,
9-(3-carboxymethylbenzyl)-8-hydroxy-2-pentoxyadenine,
9-(3-carboxymethylbenzyl)-8-hydroxy-2-(2-phenyloxyethoxy)adenine,
5 2-[3-(N-acetylamino)propoxy]-9-(3-carboxymethylbenzyl)-8-hydroxyadenine,
9-(3-carboxymethylbenzyl)-8-hydroxy-2-[3-(N-methanesulfonylamino)propoxy]adenine,
9-(3-carboxymethylbenzyl)-2-cyclopentyl-8-hydroxyadenine
9-(3-carboxymethylbenzyl)-8-hydroxy-2-(3-hydroxypropane-1-yl)adenine,
10 9-(3-carboxymethylbenzyl)-8-hydroxy-2-(2-pyridylmethoxy)adenine,
9-(3-carboxymethylbenzyl)-8-hydroxy-2-(3-pyridylmethoxy)adenine,
9-(3-carboxymethylbenzyl)-8-hydroxy-2-(2-phenylsulfanylethoxy)adenine,
and
15 9-(3-carboxymethylbenzyl)-8-hydroxy-2-(tetrahydrofuran-2-ylmethoxy)adenine.